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High Plains Herald

The National Weather Service provides weather forecasts and warnings for the protection of life and property and the enhancement of the national economy.

Spring 2012

Inside this Issue:

Why Does the National Weather Service Want Storm Spotters?

By John Griffith

For many years, storm spotting has continued to evolve and advance. Originally the primary concern for storm spotters was tornadoes and thunderstorms. These severe weather events still make up the majority of storm spotter activations. Today storm spotters are also activated for a wide range of severe weather events such as hurricanes, winter weather, and floods.

Over the last 30 years there have been many advancements that have helped volunteer storm spotters become more effective. Cell phones, once a rarity, are commonplace. They can provide voice as well as data communication in many areas. Computers have become an essential tool for the storm spotter. Combined with modern software packages they give the storm spotter access to data not available 30 years ago. Today, weather information can arrive via television, radio, satellite, NOAA Weather Radio, text message, e-mail, and Web sites.

The purpose of a storm spotter is to relay ground truth information to those that issue warnings and forecasts. That is why the NWS has developed a program to train storm spotters. NWS meteorologists conduct this training to provide a solid background in the basics of what to look for when severe weather threatens an area. The primary audience is not just experienced storm spotters but also for those new to this aspect of the hobby or interested in getting into storm spotting. The usual NWS definition of a storm spotter's responsibility is "to identify and describe severe local storms." The purpose of having this pool of trained volunteers is to provide ground truth reports which along with other partners, such as media, storm chasers, public safety officials, and emergency management, make up a reporting network. Information from this network is used, along with information from radar and other sources, in issuing severe weather watches, warnings, and advisories.

Please refer to the WFO Cheyenne Spotter Training Schedule on Page 5 and plan to attend a class near you.


"... they provide visible indications on what is going on now in the atmosphere. . . ."

Inside this Issue:

Types of Clouds and What They Mean

By Mike Weiland

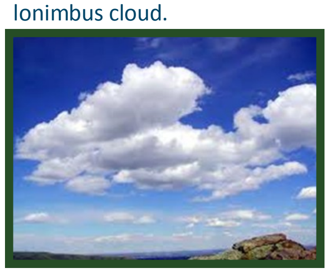
Clouds are probably one of the most common visible weather elements. On many days, we can see at least a few clouds in the sky. Clouds occur where the atmosphere at the cloud level is saturated and is a sign that there is moisture present. The moisture for clouds can either move into an area or develop as air is lifted by such things as heating of the ground, mountains and fronts. When air rises, it cools and if there is enough moisture present, clouds will form when the cooling air reaches a certain level.

Clouds are needed before any rain or snow can fall. The precipitation occurs when the depth of the cloud (moisture) is deep enough to have available larger water droplets or ice crystals start to fall due to their weight.

There are different types of clouds and they are important because they provide visible indications on what is going on now in the atmosphere and what might take place later. Each cloud type indicates an increase in moisture at a certain level, but each cloud type also means something different and gives us clues to what is happening in the air around us. Based on the clouds and their clues, one can make a pretty good short term forecast without knowing anything else about the weather at that time.

So, what are the types of clouds that we normally see? Clouds are described first of all by height above the ground. These are low, mid and high. The low clouds are usually between the surface and 7 thousand feet above the ground. Mid level clouds are usually from 7 thousand to 14 thousand feet above the ground and **high clouds** are higher than 14 thousand feet above the ground. Clouds at the various levels are then further divided into whether they are slowly rising (flatter) or more quickly rising (billowy).

Low clouds produce most of the precipitation that we receive and include stratus, cumulus and cumulonimbus. The stratus are the flatter clouds that we see often in the winter during and around periods of snow and can be only a few hundred feet off the ground. They usually produce the more steady rain or snow and are of a much longer duration. The rain and snow is also not quite as heavy. Meanwhile, a cumulus cloud is usually found in the warm season and has bases between 2 and 7 thousand feet above the ground. They are the billowy clouds that we see many summer days. Cumulus clouds are the precursor to thunderstorms and many times, a cumulus cloud will grow into a thunderstorm (or cumulonimbus cloud). If you see a cumulus cloud, there is air rising under that cloud. If there is enough moisture and rising air, it will develop into a cumulonimbus cloud.



Cumulus Clouds

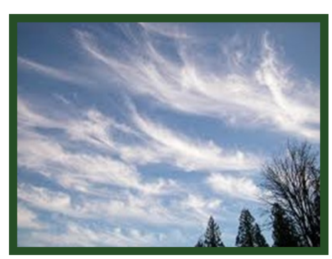
Mid clouds indicate that moisture is present between about 7 thousand to about 14 thousand feet above the ground. Many times, especially in the winter, moisture and clouds will increase first as high clouds and then lower.

So, a mid cloud can be part of that increasing moisture process. Mid clouds in the winter in the form of lenses are called lenticular clouds and indicate the presence of strong winds at the mountain top level. Often, when you see a lenticular cloud, strong surface winds are occurring or will be occurring soon. These lenticular clouds form to the east of mountain ranges. In the summer, the presence of turrets on mid clouds indicates that the atmosphere is already unstable and afternoon thunderstorms are a possibility.

Lenticular Clouds

High clouds are made up of entirely of ice crystals which differs from the other levels of clouds which have a mix of rain drops and ice crystals. As mentioned earlier, high clouds increasing in the winter can indicate the approach of a storm system.

Clouds are with us daily and can be pretty and interesting to look at. Clouds can also indicate upcoming weather. Next time you look at the sky, try to see what kinds of clouds are around and make your own forecast. The following link has some fun games to play with cloud identification (http://eo.ucar.edu/webweather/cloud3.html). Enjoy!



Cirrus Clouds

Proud History of Volunteer Observers

By Debbie Winston

Louise Rochon Hoover's painting, "Secretary Henry Posts Daily Weather Map in Smithsonian Building, 1858." Commissioned for the Smithsonian.

In 1846, Joseph Henry, Secretary of the newly formed Smithsonian Institution realized the potential of weather observations to provide warnings to the public and proposed: "a system of extended meteorological observations for solving the problem of American storms." With the introduction of the telegraph and since storms in the U. S. generally move from west to east, Joseph Henry could see the possibilities of forecasting by sending messages ahead with enough time to effectively warn people of coming storms: "the extended lines of telegraph will furnish a ready means of warning the more northern and eastern observers to be on the watch for the first appearance of an advancing storm."

Henry's program became known as the Smithsonian Meteorological Project, which started with a budget of $1,000 and about 150 volunteers and eventually spread to 600 volunteer observers in the U. S., Canada, Mexico, Latin America and the Caribbean. Volunteers were given instructions, forms and, in some cases, instruments which they used to report weather observations, daily temperatures, barometric pressure, humidity, wind, and precipitation. They were also asked for their observations on 'casual phenomena'; thunderstorms, hurricanes, tornadoes, earthquakes, meteors and auroras. Henry had also arranged with many telegraph companies to allow free transmission of local weather date to the Smithsonian.

Up to 500,000 observations were collected in a year. It took 15 people to make the necessary calculations. The observations and other data were published in two volumes of climatic data and storm observations from 1854 to 1859.

With the telegraph dispatches Henry devised a large daily weather map, "to show at one view the meteorological condition of the atmosphere over the whole country." When the telegraph reports were received a white disc was placed for fair weather, blue discs were used for snow, black for rain, and brown were it was cloudy. The discs also had arrows to show the wind direction. In May 1857, the Washington Evening Star began publishing daily weather conditions for close to twenty cities.

The Civil War interrupted the Smithsonian Meteorological Project due to telegraph lines being used for urgent public business and secession cutting off the observers in the south. The program was renewed after the war and in the 1866 Smithsonian Annual Report a long term observer was recognized; "Meteorological Observations made at Brunswick, Maine for fifty-two years by Professor P. Cleveland, from 1807 to 1859." The report of the Secretary gives the total number of observers in 1866 as 352.

The National Weather Service continues the long tradition of volunteer weather observers through our Cooperative Observer Program (COOP). Observers take observations in the country and in the cities all over the United States. These volunteers provide observational meteorological data in near real-time to support our forecasts and warnings.

Thank you to all of the volunteers in the Cheyenne County Warning Area for your continued support.

Weather Spotter Training Schedule on Page 5.

We hope to see you there.

Inside this Issue:

The record for Volunteer Observers in the Cheyenne Office County Warning Area is held by John Kortes, who was an observer for 75 years.

Wayne Worner was an observer for 71 years and his wife Mildred was an observer for 70 years.

Seminoe Dam will soon receive a 75 Year Institutional Award.

NWS Event Driven Products and Dissemination Methods

By Mike Jamski

The National Weather Service (NWS) developed a multi-tier concept for forecasting or alerting the public to all types of hazardous weather:

Outlooks: Hazardous weather outlooks are issued daily addressing potentially hazardous weather or hydrologic events that may occur during the next seven days. The outlooks will include information about potential severe thunderstorms, heavy rain or flooding, winter weather, extremes of heat or cold, etc. It is intended to provide information to those who need considerable lead time to prepare for the event.

Watches: Watches are issued when the risk of a hazardous weather or hydrologic event has increased significantly, but its occurrence, location or timing is still uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so. A watch means that hazardous weather is possible, but not imminent. People should have a plan of action in case a storm threatens and they should listen for later information and possible warnings especially when planning travel or outdoor activities.

Warnings: Warnings are issued when hazardous weather or hydrologic events are occurring, imminent or likely. A warning means weather conditions pose a threat to life or property. People in the path of the storm need to take protective action.

Advisories: Advisories are issued when hazardous weather or hydrologic events are occurring, imminent or likely. Advisories are for less serious conditions than warnings, which cause significant inconvenience and if caution is not exercised, may lead to situations that may threaten life or property.

The NWS utilizes the following methods of disseminating hazardous weather information to the public:

NOAA Weather Radio All-Hazards (NWR) is a special radio system that transmits warnings and forecasts 24 hours a day across most of the United States. The system, owned and operated by the NWS, consists of more than 900 transmitters, covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. NWR requires a special radio receiver or scanner capable of picking up the signal. It is broadcast on seven frequencies centered around 162 MHz in the VHF frequency band. In recent years, national emergency response agencies such as FEMA and the Department of Homeland Security have begun to take advantage of NWR's ability to efficiently reach a large portion of the population. The system is now used to broadcast civil and natural emergency information in addition to that relating to weather.

NOAA Weather Wire Service (NWWS) is a satellite data collection and dissemination system operated by the NWS. Its purpose is to provide state and federal government, commercial users, media, and private citizens with timely delivery of meteorological, hydrological, climatological, and geophysical information. All products in the NWWS data stream are prioritized, with weather and hydrologic warnings receiving the highest priority. NWWS delivers severe weather and storm warnings to users in 10 seconds or less from the time they are issued, making it the fastest delivery system available.

EMWIN, or Emergency Managers Weather Information Network, is a system designed to provide the emergency management community with access to a set of NWS warnings, watches, forecasts, and other products at no recurring cost. It can receive data via radio, internet, or a dedicated satellite dish, depending on the needs and capabilities of the user.

The NOAAPORT broadcast system provides a one-way broadcast communication of NOAA environmental data and information in near real time to NOAA and external users. This broadcast service is implemented by a commercial provider of satellite communications utilizing C-band frequencies.

The Interactive Weather Information Network (IWIN) is an internet site operated by the NWS that provides cost-free access to most current products.

Since 1983, the NWS has provided external user access to U.S. Government obtained or derived weather information through a collection of data communication line services called the Family of Services (FOS). All FOS data services are driven by the NWS Telecommunication Gateway computer systems located at NWS headquarters in Silver Spring, MD. Users may obtain any of the individual services from NWS for a one-time connection charge and an annual user fee.

Each NWS Weather Forecast Office (WFO) maintains its own web page with access to current products and other information specific to their local area.

To access the Cheyenne WFO website go to:

www.weather.gov/cys

We would like feedback. Send us your comments or suggestions at cys.info@noaa.gov

Inside this Issue:

Inside this Issue:

Become a Weather Spotter! See the Article on Page 1 and the Training Schedule on Page 7.

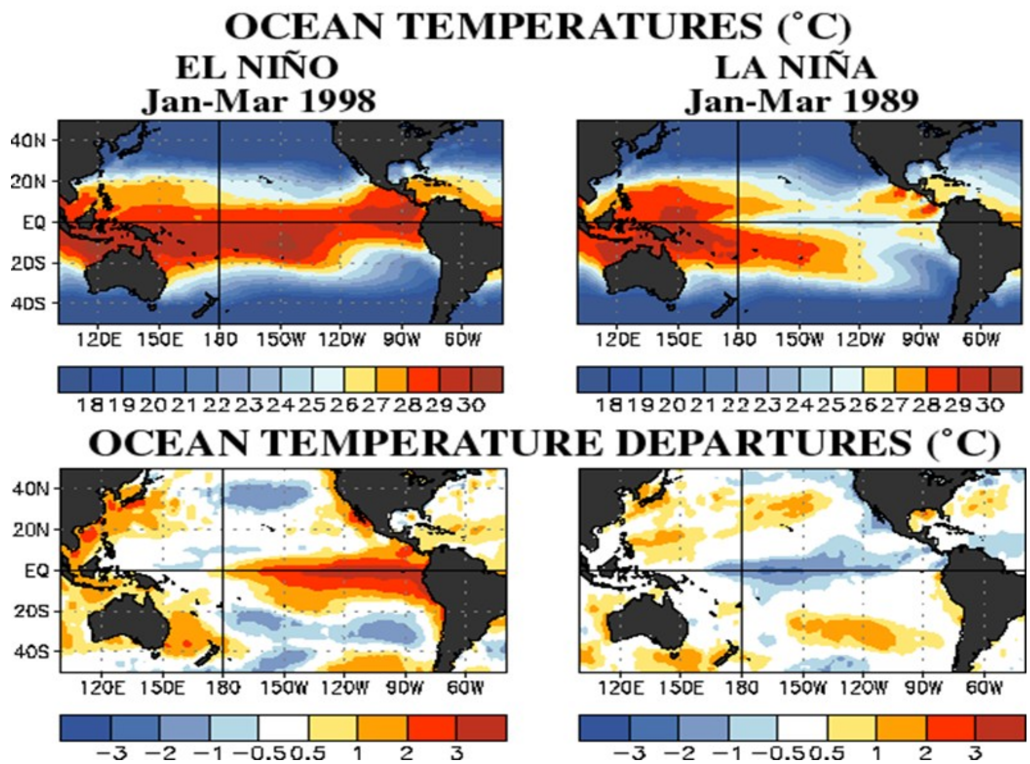
El Niño /La Niña

By Richard Emanuel

What do these terms mean? How do they affect YOU?

It is very likely that you have heard of the terms El Niño and La Niña, perhaps while listening to a TV broadcast or other media. You may have heard that, “There is going to be an El Niño winter coming up”, or perhaps a La Niña winter, and that it is going to affect weather patterns across the country and even the globe, and could cause problems in some areas due to their effects. But just what are these events? How do they affect us, if at all? And should I do something to prepare for them?

The terms El Niño and La Niña refer to a condition in which the oceanic waters over the tropical Pacific Ocean become significantly warmer or colder than average, respectively. The area of note is the equatorial region of the Pacific Ocean between approximately the date line and 120oW. Officially, NOAA's Climate Prediction Center, which is part of the National Weather Service, declares the onset of an El Niño or La Niña episode as being when the 3-month average sea-surface temperature departure exceeds 0.5oC above or below the norm, respectively, in that area. The following two diagrams depict El Niño and La Niña as seen in sea surface temperature anomalies:



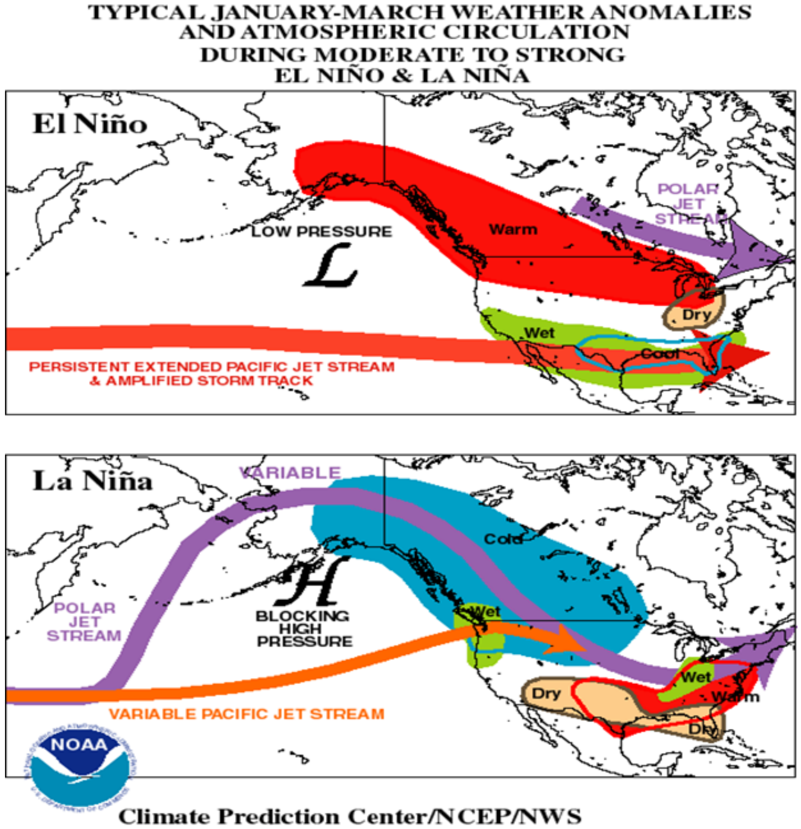
You can clearly see the significantly warmer than normal water temperatures (the reddish shadings) in the equatorial central and eastern Pacific Ocean depicted in the bottom left diagram indicating as strong El Niño event, while a strong La Niña event is depicted in the bottom right diagram, shown by the strip of colder than normal water temperatures (blue shadings) in that same general area. The strength of these events varies, with strong events being anywhere from 3 to 6 degrees F above or below normal. El Niño and La Niña events typically last about 9-12 months or so. They often begin to form in the summertime, reach peak strength in winter to early spring, and then decay by the following summer. However, some episodes have lasted 2 years and even as long as 3-4 years. They do not occur at regular intervals, but in general, El Niño and La Niña occurs every 3-5 years on average, usually alternating from one to the other. La Niña’s do show more of a tendency than El Niño to occur in multiple years and in fact the current La Niña event has occurred for two consecutive northern hemisphere winters.

So how do El Niño and La Niña affect North America, and for that matter this general area? Basically, they alter temperature and precipitation patterns by altering the jet stream flow and associated storm tracks, especially in the winter and spring, when El Niño and La Niña are typically strongest. The following diagrams show general effects over North America for each event:

Continued on Page 8

El Niño /La Niña Continued

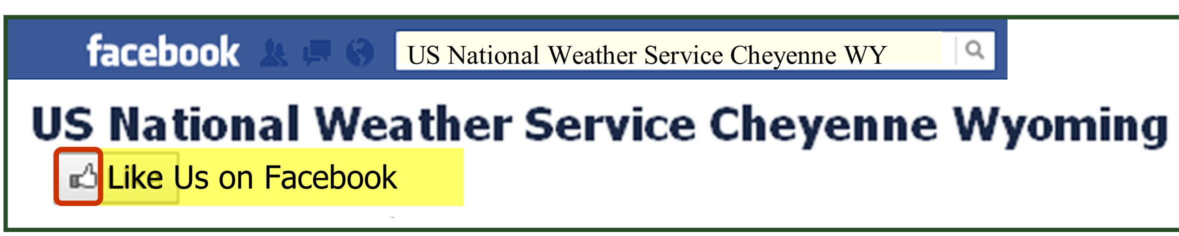
By Richard Emanuel



As you can see, El Niño tends to bring enhanced precipitation across the southern part of the U.S. due to a more persistent jet stream and embedded storm systems moving across that region, while warmer than average weather occurs from southern Alaska into the northern U.S. due to cold arctic air being diverted more eastward across central and eastern Canada. La Niña reduces the effects of the moist southerly jet and instead allows the cold polar jet to drop into the country and allow for more significant intrusions of cold arctic air, in the absence of other factors.

Effects in our general area

El Niño shows a fairly strong correlation with wetter than normal conditions in this area during the winter and spring, while La Niña shows a pronounced drier than normal effect, especially in the fall and winter. Temperature effects are a little less defined, but generally are cooler than normal during La Niña and warmer than normal during El Niño. La Niña also shows a strongly pronounced increase in windiness across the region, which is a result of the stronger jet stream and associated storm systems tracking over and close to this region. In general, it is about 35% windier in this region during La Niña as opposed to El Niño, with more high wind events occurring during La Niña. The current and previous winters across this area have attested to this, with Cheyenne seeing some of its strongest wind gusts on record this winter. One benefit from La Niña is a tendency to deposit higher than average snow over the mountains, which helps to replenish and maintain water supplies in area reservoirs once the snow melts. This has been the case the last couple of seasons.



Inside this Issue:

"...El Niño tends to bring enhanced precipitation across the southern part of the U.S..."

2012 Weather Spotter Training Schedule

By John Griffith

Below is the list of severe weather spotter training events scheduled for southeast Wyoming and the Nebraska Panhandle in 2012.

All talks are open to the public, last about 90 minutes and are free of charge. No prior experience is necessary. We will teach you everything you need to know! If you have any questions about these events, contact our Warning Coordination Meteorologist, John Griffith, at 307-772-2468 extension: 726.

The Weather Spotter's Field Guide will not be available at the training, as it has been in the past. If you would like to print the Guide go to: http://www.nws.noaa.gov/om/brochures/SGJune6-11.pdf.

March, 2012 - Upcoming			
Day	**City, State**	**Time**	**Location**
20	**Scottsbluff, NE** **(Scotts Bluff County)**	7:00pm MDT	WNCC Harms Advanced Tech Center 2620 College Park (E side entrance) Room A108 Plex
21	**Hemingford, NE** (Box Butte County)	7:00pm MDT	Fire Hall
April, 2012 - Upcoming			
Day	**City, State**	**Time**	**Location**
4	**Sidney, NE** Cheyenne County	**7:00pm MDT**	Sidney High School
5	**Douglas, WY** Converse County	**6:00pm MDT**	Converse County Courthouse Basement Training Room
10	**Torrington, WY** Goshen County	**1:30pm MDT**	Goshen County Courthouse Basement - Training Room
10	**Torrington, WY** Goshen County	**6:30pm MDT**	Goshen County Courthouse Basement - Training Room
11	**Bridgeport, NE** Morrill County	**7:00pm MDT**	Fire Hall
16	**Wheatland, WY** (Platte County)	**6:00pm MDT**	Wheatland Fire Training Center
17	**Laramie, WY** Albany County	**7:00pm MDT**	Fire Station #3 W Jefferson St
18	**Cheyenne, WY** Laramie County	**6:00pm MDT**	Laramie County Community College Training Center Rooms 120 & 121
19	**Ft Robinson, NE** (Dawes County)	**6:00pm MDT**	Buffalo Barracks

SKYWARN
WEATHER.GOV®

Since the program started in the 1970s, the information provided by SKWARN® spotters, coupled with Doppler radar technology, improved satellite and other data, has enabled NWS to issue more timely and accurate warnings for tornadoes, severe thunderstorms and flash floods.

SKYWARN® storm spotters are part of the ranks of citizens who form the Nation's first line of defense against severe weather. There can be no finer reward than to know that their efforts have given communities the precious gift of time--seconds and minutes that can help save lives.

Training Covers:

- Basics of thunderstorm development
- Fundamentals of storm structure
- Identifying potential severe weather features
- Information to report
- How to report information
- Basic severe weather safety

"…all talks are open to the public, last about 90 minutes and are free of charge…"

Inside this Issue:

CoCoRaHs

By Mike Weiland

If you aren't a member already, CoCoRaHs (Community Collaborative Rain and Hail Study) is looking for interested people to measure rain and snow. This is a totally volunteer effort which is interesting, fun and very helpful. All that is required is a brief amount of time, an interest in weather and a computer. You will also need a rain gage, which we can help get for you if you don't have one. A report of the 24 hour rain or snowfall and snow depth will be entered on the CoCoRaHs website each day. Don't worry if you have to miss some days and you can even enter information days after the precipitation. Training is available on the CoCoRaHs website www.cocorahs.org. That is the site that you will also enter your data and sign up. For more information or if you have questions, please call Mike at 772-2468 ext. 516.

Inside this Issue:

We would like feedback. Send us your comments or suggestions at cys.info@noaa.gov

Data Collection Methods

By Mike Jamski

The National Weather Service (NWS) utilizes several methods of data collection for its forecasts, warnings, records and archives. These include surface, marine, upper air, radar and satellite observations.

The Automated Surface Observation System (ASOS) is a joint effort of the NWS, Federal Aviation Administration (FAA) and Department of Defense (DOD). The ASOS serves as the nation's primary surface weather observing network. The system transmits routine hourly observations along with special observations when conditions exceed preselected weather element thresholds. The basic weather elements observed are: sky condition, visibility, present weather, obstructions to vision, pressure, temperature, dew point, wind direction and speed, precipitation accumulation, and selected significant remarks.

Automated Surface Observation System

Before automatic weather observing began, the Cooperative Observer Program (COOP) was the only means for acquiring daily weather information. This network of approximately 11,000 volunteer weather observers still flourishes today, providing much of the meteorological and climatological data. The Community Collaborative Rain, Hail and Snow Network (CoCoRaHS), which originated at Colorado State University in 1998, is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow) throughout all fifty states.

NWS forecasters require frequent, high-quality marine observations to examine conditions for forecast preparation and verification. Other users rely on the observations and forecasts for commercial and recreational activities. To help meet these needs, the NWS's National Data Buoy Center (NDBC) operates a network of about 90 buoys and 60 land-based coastal observing systems (C-MAN). All stations measure hourly wind speed, direction, and gust; barometric pressure; and air temperature.

Upper air weather data is essential for weather forecasting and research. The NWS operates 92 radiosonde locations across North America. A small, expendable instrument package is suspended below a 6 foot wide balloon filled with hydrogen or helium, then released daily at 00 UTC and 12 UTC. As the radiosonde rises at about 1,000 feet per minute, sensors on the radiosonde measure profiles of pressure, temperature, and relative humidity. These sensors are linked to a battery powered radio transmitter that sends the sensor measurements to a ground receiver. By tracking the position of the radiosonde in flight, information on wind speed and direction aloft is also obtained.

Weather Balloon

The Next Generation Weather Radar system (NEXRAD) comprises 159 Weather Surveillance Radar-1988 Doppler (WSR-88D) sites throughout the United States. Level II data are the three meteorological base data quantities: reflectivity, mean radial velocity, and spectrum width. From these quantities, computer processing generates numerous meteorological analysis products known as Level III data. Level II data are recorded at all NWS and several select Continental U.S. DOD WSR-88D sites. Level III products are recorded at 155 of the 159 sites. The data are transmitted to the National Climatic Data Center (NCDC) for archiving and dissemination.

NEXRAD

GOES satellites circle the Earth in a geosynchronous orbit, which means they orbit the equatorial plane of the Earth at a speed matching the Earth's rotation. This allows them to hover continuously over one position on the surface. The geosynchronous plane is about 22,300 miles above the Earth, high enough to allow the satellites a full-disc view of the Earth. Because they stay above a fixed spot on the surface, they provide a constant vigil for severe weather such as tornadoes, flash floods, hailstorms, and hurricanes.

GOES Satellite

Summer of the 2011-2012 Winter

By Richard Emanuel

The winter of 2011-2012 (Which meteorologically is the period December through February) for this region turned out to be fairly typical for what is observed during La Nina, the event where water temperatures over the tropical central and eastern Pacific Ocean are cooler than average. La Nina was at moderate strength during much of the winter but has been weakening as of late winter.

The winter was characterized by generally colder than average temperatures overall during the months of December and February, with a much warmer than average January in between. February was significantly cooler than average over most areas, which is often seen during La Nina winters. All together the winter was pretty close to average over most areas. Warmer than average conditions overall were noted across the northern Nebraska panhandle while somewhat colder than average conditions were seen over far southeast Wyoming.

Temperatures: The following table summarizes the monthly and overall winter average temperatures and the departures from normal for select sites over the area:

City	Dec. AVG temp.	DEC. departure from normal	Jan. AVG temp.	January departure from normal	Feb AVG temp.	February departure from normal	Dec-Feb AVG temp.	Dec-Feb departure from normal
Cheyenne	26.0	-1.7	32.5	+3.7	25.4	-4.2	28.0	-0.7
Laramie	13.8	-7.3	26.1	+4.4	19.8	-3.7	19.9	-2.2
Rawlins	19.7	-1.8	27.2	+5.6	21.3	-2.4	22.7	+0.4
Chadron	26.7	+2.3	28.4	+4.0	28.7	+1.3	27.9	+2.5
Scottsbluff	26.0	-0.1	30.4	+3.2	29.8	-0.6	28.7	+0.8
Sidney	29.2	+0.5	31.5	+2.3	29.2	-2.8	30.0	0.0

This next table depicts the dates of warmest and coldest temperatures of the winter for selected cities as well as the warmest and coldest average daily temperatures. The total number of days with low temperatures at or below zero and the departure from normal is also noted:

City	Lowest temperature and date	Highest temperature and date	Lowest daily average temp. and date	Highest daily average temp. and date	Number of days with minus at or below zero
Cheyenne	**-6** on Dec. 5	**62** on Jan. 5	**1** on Dec. 5	**52.5** on Jan. 5	**3 (-5)**
Laramie	**-29** on Dec. 5	**54** on Jan. 5	**-15.5** on Dec. 5	**38.5** on Jan. 21	**21 (+2)**
Rawlins	**-16** on Dec. 5	**50** on Jan. 5	**-5** on Dec. 5	**39.0** on Jan. 15+	**8 (-4)**
Chadron	**-14** on Feb. 11*	**63** on Jan. 5	**5.5** on Feb. 11	**43.0** on Jan. 5	**7 (-8)**
Scottsbluff	**-10** on Dec. 6	**66** on Jan. 5	**6.5** on Dec. 5	**46.5** on Jan. 5	**5 (-7)**
Sidney	**-12** on Jan. 17	**74** on Jan. 5	**6** on Dec. 5	**51.5** on Jan. 5	**4 (-5)**

Bitterly cold arctic air was pretty much absent from the area during the winter with just a few relatively minor arctic air masses affecting the region. This is evident by the below average number of days with below zero temperatures recorded at most stations. February saw several surges of cold Canadian air which led to its relatively cold average temperature, but the combination of the moderate La Nina and a lesser known event being a strongly positive Arctic Oscillation kept the deeper arctic air out of the region, and much of the country for that matter.

Continued on Page 10

"Bitterly cold arctic air was pretty much absent from the area during the winter with just a few relatively minor arctic air masses affecting the region."

Inside this Issue:

Summer of the 2011-2012 Winter (Cont.)

By Richard Emanuel

Precipitation:

Winter precipitation turned out to be generally below average across the area with just a few locations, including Cheyenne, receiving above average precipitation. In general December and January were rather dry, while February was relatively moist. There were no big snowstorms outside of the mountains with most snowfall consisting of several relatively minor events through the season. Cheyenne recorded 4.9 inches of snow over the first 3 days of December while measuring 6 inches of snow from February 10th through the 12th. Scottsbluff's most significant snows included 3.2 inches which fell on February 10th and 11th and February 19th and 20th. Cheyenne received a total of 24.3 inches of snow during the December through February period while Scottsbluff measured 14.8 inches. Total snowfall over the plains for the period ranged from about 10 to 15 inches across the southern Nebraska panhandle to about 15 to 20 inches over the northern Panhandle. Across southeast Wyoming snowfall ranged generally from 20 to 30 inches over most locations outside of the mountains.

The following table tabulates the December through February liquid precipitation amounts and their departures from average:

City	December pcpn and departure	January pcpn and departure	February pcpn and departure	Total pcpn and departure
Cheyenne	0.49 (0.00)	0.13 (-0.20)	0.90 (+0.43)	1.52 (+0.23)
Laramie	0.23 (-0.09)	0.16 (-0.11)	0.43 (+0.09)	0.82 (-0.11)
Rawlins	0.27 (-0.16)	0.12 (-0.24)	0.64 (+0.22)	1.03 (-0.18)
Chadron	0.26 (-0.26)	0.43 (+0.07)	0.59 (-0.02)	1.28 (-0.21)
Scottsbluff	0.31 (-0.20)	0.16 (-0.25)	0.69 (+0.09)	1.16 (-0.36)
Sidney	0.10 (-0.44)	0.05 (-0.15)	0.12 (-0.20)	0.27 (-0.79)

Winds:

Anyone who has lived in this area a while knows that wind is a dominant feature during the winter, and this last winter was no exception. Winds tend to be enhanced in this area during La Nina as the atmospheric patterns tend to feature fast winds which reach the surface from time to time. The strongest winds occur mainly over southeast Wyoming in the vicinity of the mountains. Data from Cheyenne indicates that windy days in winter occur about 20-25 percent more during La Nina versus neutral or El Nino events. This last winter didn't have quite so anomalous wind, but was still enhanced. On an overall average, Cheyenne has about 30 days during the December through February time period with wind gusts of at least 40 mph. This last winter Cheyenne recorded 30 days. Of interesting note is while that figure turned out to be about average, the wind events tended to occur over several consecutive days, with relatively long periods with lighter winds in between. Cheyenne recorded a total of 9 days with wind gusts of at least 60 mph while Scottsbluff recorded two days. The most significant wind events occurred in the last week of December. Cheyenne recorded two of its top ten highest wind gusts on record during this period with gusts of 77 mph on December 29th and 76 mph on December 31st.

We would like feedback. Send us your comments or suggestions at cys.info@noaa.gov

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